JOB COMPLETION REPORTS

Statewide Wildlife Harvest Census
and Statistical Services

Year			Title	
1964-65			Statistical Services, Job No. II, W-104-R-1 Statewide Wildlife Harvest Census, Job No. I, W-104-R-1	
1965-66			Statewide Wildlife Harvest Census, Job No. I, W-104-R-2 Statistical Services, Job No. II, W-104-R-2	
1966-67			Statewide Wildlife Harvest Census (and) Statewide Wildlife Statistical Services, Job No. I & II, W-104-R-3	
1967-68			Statewide Wildlife Harvest Census and Statewide Wildlife Statistical Services, Job No. I & II, W-104-R-4	
1968-69		1 & 2	Statewide Wildlife Harvest Census (and) Statewide Wildlife Statistical Services	
1969-70		1 & 2	Statewide Wildlife Harvest Census and Statewide Wildlife Statistical Services	
1970-71		1 & 2	Statewide Wildlife Harvest Census and Statewide Wildlife Statistical Services	
1971-72	W-104-R-8	1 & 2	Statewide Wildlife Harvest Census and Statewide Wildlife Statistical Services	MM 8-3-73
1972-73	W-104-R-9	1 & 2	Statewide Wildlife Harvest (1) and Statewide Wildlife Statistical Services	MM 3-13-74
1973-74	W-104-R-10	1 & 2	Statewide Wildlife Harvest (1) and Statewide Wildlife Statistical Services	MM 5-12-75

JOB PROGRESS REPORT

SURVEY AND INVENTORY PROJECT

State Montana

Project No. W-104-R-10 Title Wildlife Statistical Services

Job No. 1 & 2 Job Title Statewide Wildlife Harvest - (Job 1) and Statewide Statistical Services (Job 2)

Period Covered July 1, 1973 through June 30, 1974

Note: This is a Progress Report. Results presented herein are not necessarily final and may be subject to change. The information contained in this report may not be published or used without permission of the Director of the Montana Department of Fish and Game.

Abstract: Game harvest surveys were conducted using standardized questionnaires and computer programs to estimate harvests. Statewide game harvest estimates for the report period are presented. Regional game harvests are reported on the Game Survey and Inventory Reports of each regional job under Project W-130-R.

Statistical services were provided to game research projects. Data processing services were the primary contribution to Job 2, Statewide Statistical Services. Analysis of these research data appear in the several reports for Federal Aid Projects W-105-R, W-120-R, and certain other reports.

Recommendations: The services of Project W-104-R should be continued. The game and fur harvest mail surveys will be reviewed, revised and updated on a continuing basis. The statistical services and data processing services are required by the game research projects and work progress is expected to develop an increased need of these services.

Procedures: Questionnaires were mailed to selected license holders, according to a predetermined schedule, to estimate the harvest and certain other data concerning antelope, moose, mountain sheep, mountain goat, deer, elk, bear, upland game birds, turkey and waterfowl.

An archery survey was also conducted to estimate days spent hunting certain big game species, as well as numbers taken. The questionnaires were mailed after the hunting season closed.

The returned questionnaires were edited and submitted to the Data Processing Bureau for recording. Reminder cards were sent to non-respondents to increase the return of questionnaires. Estimates of the number of hunters, game killed and hunter success were obtained by analyses according to previously prepared programs available at the State Data Processing Bureau. Harvest results were given appropriate distribution and the required records were maintained. A "self-contained" questionnaire form is being considered for the 1974 harvest questionnaire to eliminate use of mail inserter machines.

Game research data were tabulated at the Data Processing Bureau for later analyses. Wing envelope survey data were analyzed and distributed to the Regional Survey and Inventory Projects. Results of these services were presented in appropriate research project progress reports.

Findings: During the report period the black bear portion of the deer-elk-bear harvest survey was done separately. Analysis procedures were also conducted separately. During the report period, minor changes were made in the analysis procedures of the data collected from the deer-elk questionnaire.

At this time, the following questionnaires are used:

Either-sex elk (permit holders)
Archers (big game)
$35 nonresident deer
Trappers
Moose-sheep-goat-antelope
Deer-elk
Upland birds (pheasants - waterfowl - turkeys)
Black bear

We also use a questionnaire for swan permit holders. In the case of the moose-sheep-goat-antelope questionnaire, data processing machines print the species involved as well as the hunting district on the questionnaire to identify it as to type. The name and address of the recipient is also printed at the same time.

During the report period, questionnaires were sent as listed on the attached summary.

Summary of Harvest Questionnaire Mailout

Year	Species	Initial Mailing Number	Initial Mailing Date Sent	Initial Mailing Cut Off Date	Reminder Number	Reminder Date Sent	Reminder Cut Off Date	Total Sent
1973	Upland & Migratory Game Bird*	10,749	1-25-74	2-28-74	4,672	2-28-74	3-29-74	15,421
1973	Moose	799	1-31-74	3-1-74	209	3-7-74	4-4-74	1,008
1973	Sheep	816	1-31-74	3-1-74	318	3-7-74	4-4-74	1,134
1973	Goat	635	1-31-74	3-1-74	190	3-7-74	4-4-74	825
1973	Antelope	3,115	1-31-74	3-1-74	1,290	3-7-74	4-4-74	3,405
1973	Deer-elk nonpermit	63,238	3-4-74	4-4-74	29,972	4-13-74	5-13-74	93,210
1973	Elk permit	2,930	2-13-74	3-13-74	520	4-13-74	5-13-74	3,450
1973	$35 Nonresident Deer	1,802	2-13-74	3-13-74	389	4-13-74	5-13-74	2,191
1973	Fur Trapper							
	General	1,467	4-8-74	5-8-74	572	5-9-74	6-21-74	2,039
	Landowner	155	4-8-74	5-8-74	49	5-9-74	6-21-74	204
1973	Archery	1,840	3-11-74	4-11-74	861	4-22-74	5-10-74	2,701
1973	Black Bear	6,326	7-15-74	8-15-74	2,178	8-21-74	9-18-74	8,504

* Turkey and Waterfowl included in Upland and Migratory Game Bird totals.

Average number of days spent hunting the various species, including archers, is given in Table 1.

The official report of big game harvested in Montana during 1973 is given in Table 2. The estimates are all from the mail survey except the grizzly bear harvest, which was determined by the number of trophy licenses issued.

The detailed statewide game harvest survey results showing confidence limits of estimated hunters and animals killed for the period 1969-1973 of big game (Table 3) and upland birds, (Table 4) are part of this report. The harvest of fur animals and waterfowl are reported as jobs in the Statewide Wildlife Survey and Inventory Project W-130-R.

The various aspects of this entire project are continually reviewed in order to update, eliminate or modify any phase. Appendicies A, B, and C to this report present results of such reviews. Deer and elk harvest estimates for the years 1971, 1972 and 1973 were recalculated for each of the department's several administrative regions. These recalculated estimates were sent to the regions and are not included in Appendix B.

The results of game research data handled by the Data Processing Bureau have been reported under other appropriate projects.

Prepared by: Joseph L. Egan Approved by: Wynn G. Freeman

Joseph L. Egan

Date: April 30, 1975

TABLE 1. Average number of days spent by Montana hunters, statewide, hunting certain game species.

	Year	Deer A Tag	Deer B Tag	Elk	Upland Birds	Turkey	Archery Deer	Archery Elk	Archery Antelope
Days Hunted	1969	4.7	3.9	7.0	5.9	1.7	5.2	3.7	2.0
	1970	4.8	3.7	6.9	6.1	1.8	5.6	4.2	1.8
	1971	5.5	3.9	7.3	6.0	1.4	5.7	4.6	2.8
	1972	5.8	4.4	7.3	6.0	1.6	6.2	5.2	3.5
	1973	5.8	4.2	7.3	5.8	2.6	5.8	4.6	2.3

	Year	Antelope	Mountain Goat	Bighorn Sheep	Moose
Days Hunted	1969	2.0	4.0	7.6	-
	1970	2.0	-	-	-
	1971	3.0	4.3	7.2	6.3
	1972	2.0	4.2	7.9	6.4
	1973	3.0	4.0	7.5	6.0

TABLE 2. 1973 Montana Big Game Harvest*

Mule Deer	88,300**	
White-tailed Deer	34,340	
Total Deer		122,650
Elk	15,230	
Antelope	19,300	
Moose	600	
Sheep	90	
Goat	280	
Black Bear	1,350	
Grizzly Bear	15	

* Mail survey estimates plus seasons not covered by survey.
** Survey figures "rounded off" to nearest zero.

TABLE 3. Montana big game harvests, statewide, 1969-73[1/]

Species	Year	Number of Licenses Lim.	Number of Licenses Unlimited	Number of Hunters Low	Number of Hunters Point	Number of Hunters High	Number of Hunters Unlim.	Number Killed Low	Number Killed Point	Number Killed High	Number Killed Unlim.	Percent Success Lim.	Percent Success Unlim.
Deer	1969		167,341	127,617	128,177	128,738		101,634	102,826	104,108			80
	1970		184,899	136,208	136,903	137,598		109,231	110,508	111,784			81
	1971		192,573	151,973	152,316[2/]	152,659		103,893	104,365	104,837			69
	1972		205,568	169,244	169,579[2/]	169,914		100,951	101,437	101,923			60
	1973		237,971[7/]	195,574	195,981[2/]	196,388		122,088	122,648	123,208			63
Elk	1969		83,986	73,373	73,848	74,322		11,498	12,082	12,666			16
	1970		87,327	77,271	77,819	78,368		13,364	13,988	14,611			18
	1971		89,334	63,982	64,218[3/]	64,454		10,363	10,559[3/]	10,755			16
	1972		95,512	66,376	66,625	66,874		9,220	9,411[4/]	9,602			14
	1973		109,372[7/]	78,364	78,653	78,942		14,986	15,234	15,482			19
Antelope	1969	23,167		19,659	19,871	20,082		14,251	14,543	14,834		73	
	1970	26,838		23,452	23,697	23,941		17,676	18,023	18,370		76	
	1971	28,636		24,402	24,802	25,201		17,856	18,403	18,949		74	
	1972	32,271		21,982	22,463	22,943		14,885	15,488	16,090		69	
	1973	32,404		27,514	28,062	28,609		18,533	19,303	20,072		69	
Moose	1969	668		642	645	648		448	457	466		71	
	1970	708		669	673	677		516	523	530		78	
	1971	700		674	677	680		465	474	483		70	
	1972	641		615	619	623		400	408	416		66	
	1973	799		762	766	770		589	597	605		78	
Bighorn Sheep	1969	80	279	76	77	78	241	48	50	52	17	65	7
	1970	63	447	57	59	61	447	40	43	46	31	73	7
	1971	66	490	64	64	64	452	48	50	52	40	78	9
	1972	70	531[6/]	71	71	71	574[6/]	49	50	51	54	70	9
	1973	77	739[6/]	75	76	77	754[6/]	55	57	59	35	75	5
Mountain Goat	1969	630	266	537	543	549	213	258	267	276	66	49	31
	1970	670	305	573	580	587	223	293	303	313	51	52	23
	1971	637	273	541	547	553	215	229	238	247	59	44	27
	1972	664	0	538	546	554	0	225	234	243	0	43	0
	1973	635	0	551	556	561	0	272	280	288	0	50	0

Table 3. Continued.

Species	Year	Number of Licenses		Number of Hunters				Number Killed				Percent Success	
		Lim.	Unlim.	Low	Point	High	Unlim.	Low	Point	High	Unlim.	Lim.	Unlim.
Black Bear	1969		5/	8,250	8,787	9,324		1,499	1,735	1,972			20
	1970		5/	6,707	7,204	7,700		906	1,079	1,252			15
	1971	2,884		4,952	5,105	5,258		1,109	1,185	1,261			23
	1972	4,941		3,347	3,382	3,417		899	928	957			27
	1973	8,860 7/		4,954	5,019	5,084		1,294	1,347	1,400			27
Archery:	1970		4,632		3,774								
	1971		5,370		4,516								
	1972		6,579		5,305								
	1973		10,390										
Deer	1970			3,310	3,438	3,566		355	441	526			13
	1971			3,915	4,066	4,217		482	593	705			15
	1972			4,614	4,794	4,473		401	511	622			11
	1973			6,869	7,162	7,455		551	712	872			10
Elk	1970			1,638	1,780	1,922		10	29	52			2
	1971			2,033	2,208	2,383		21	57	94			3
	1972			2,762	2,966	3,170		33	77	122			3
	1973			4,610	4,927	5,244		46	111	177			2
Antelope	1970			153	214	276		10	35	60			16
	1971			163	236	309		0	7	20			3
	1972			324	426	528		0	23	48			6
	1973			355	489	624		0	22	52			5

1/ Does not include recalculated figures from Appendix A and B.
2/ This figure represents the point estimate of the total number of the various kinds of deer licenses used. The point estimate of actual numbers of hunters would be less.
3/ Does not include those under special either-sex permit. Inclusion of special either-sex permit increases point estimate of hunters to 66,239 and harvest to 11,586.
4/ Does not include late season hunts.
5/ A specific bear license was not required.
6/ These licenses valid in both hunting district 301 and 501. "Unlimited" under number of hunters column indicate some permit holders also hunt in both hunting districts.
7/ Includes all persons licensed to hunt this species.

TABLE 4. Montana upland game bird harvest, statewide, 1969-1973.

Year	Number Licenses	Number Hunters	Total Birds	Pheasant	Sharptail	Sage Grouse	Blue Grouse	Ruffed Grouse	Franklin Grouse	Hungarian Partridge	Chukar	Un-Known
Upland Game Birds:												
1969	60,080	50,842	441,500	114,528	99,776	54,201	40,980	38,763	19,455	69,088	2,956	
1970	60,275	41,478	353,361	96,303	73,033	36,879	38,035	36,694	20,122	49,563	1,327	
1971	61,036	34,348	332,425	90,643	78,549	40,574	30,454	34,348	17,200	36,660	2,260	
1972	65,481	39,500	339,395	68,138	76,544	43,067	41,186	50,014	24,772	32,626	2,253	
1973*	109,886 1/	46,239	406,427	66,314	89,741	45,994	64,312	61,492	34,685	40,620	1,379	1,890
Turkeys (Fall Harvest):												
1969	1,592	1,298	360									
1970	1,262	946	250									
1971	1,679	1,196	547									
1972	2,238	1,223	444									
1973	2,082	1,463	477									

* See Appendix C.

1/ Includes all persons licensed to hunt upland birds. Previous figures do not include all these people.

A P P E N D I X A

STATE OF MONTANA

DEPARTMENT OF FISH AND GAME

HELENA, MONTANA

Office Memorandum

TO : Wesley R. Woodgerd, Attn: Joseph L. Egan **DATE:** December 2, 1974

FROM : Eugene O. Allen

SUBJECT: Percent deer and elk hunters afield

Enclosed is the data you requested a couple of months ago. A few things are quite interesting:

1. The group of hunters with the highest rate of participation is the $35 nonresident deer hunter.

2. The group with the lowest rate of participation is the nonresident B-tag hunter.

3. Both the resident and nonresident rate of participation for elk hunters are lower than I would have guessed.

4. The size of the difference between 1969-70 averages and those for 1971-73 for resident Deer A and B and elk suggests a possible sampling sproblem. I suggest we contact B. Gooch for his comments.

EOA:mms
Encl.

Number of hunting licenses sold and percent hunters afield in Montana for the years 1969-73.

Type of License	1969			1970			1971			1972			1973		
	No. Tags Sold	No. of[1] Hunters	Percent[2] Hunting	No. Tags Sold	No. of Hunters	Percent Hunting	No. Tags Sold	No. of Hunters	Percent Hunting	No. Tags Sold	No. of Hunters	Percent Hunting	No. Tags Sold	No. of Hunters	Percent Hunting
Deer															
Resident															
A-tag[3]	125,506	113,541	90	131,918	119,483	91	135,363	104,473	77	139,479	113,716	82	154,556	122,846	79
B-tag[4]	27,538	23,779	86	33,669	28,309	84	31,496	20,283	64	37,761	24,995	66	52,775	34,976	66
Nonres.															
A-tag[5]	8,612	6,975	81	9,501	7,876	83	11,973	8,850	74	13,970	10,843	78	19,230	16,682	87
B-tag[5]	8,612	4,870	57	9,501	4,962	52	11,973	5,435	45	13,970	7,062	51	19,230	11,094	58
$35.[6]	7,821	7,661	98	10,329	9,544	92	13,741	13,275	97	13,549	12,963	96	10,745	10,383	97
Total	178,089			194,918			204,546			218,729			256,536		
Elk															
Resident[7]	75,374	67,430	89	77,827	70,503	91	78,285	55,133	70	81,102	56,723	70	89,771	64,453	72
Nonres.[8]	8,612	6,418	75	9,501	7,317	77	11,973	9,085	76	13,970	9,902	71	19,230	14,200	74
Total	83,986			87,328			90,253			95,072			109,001		

[1] From annual big game hunter questionnaire. The "point" value was used because the difference between the "upper" and "lower" range was less than 1 percent.

[2] Percent of licensed hunters who were reported as actually hunting. For example, if 100 licenses were sold and only 85 hunters were reported as actually hunting, then 85 percent of the hunters were afield.

[3] Resident A-tag includes: Sportsman, deer A adult and deer A youth licenses.

[4] Resident B-tag includes: deer B adult and deer B youth license.

[5] Nonresident A and B tags include: nonresident big game ($150) license.

[6] $35 nonresident deer includes: $35 and $36 nonresident deer licenses.

[7] Resident elk includes: Sportsman, elk adult and elk youth licenses.

[8] Nonresident elk includes: nonresident big game ($150) license.

APPENDIX B

STATE OF MONTANA

DEPARTMENT OF ADMINISTR

DATA PROCESSING BUREAU

MITCHELL BUILDING, HELENA, MONTANA 59601

March 19, 1975

Mr. Joseph Egan, Assistant Administrator
Game Division
Montana Department of Fish and Game
Helena, Montana 59601

Dear Joe:

This is in response to questions concerning the apparently low hunter participation rates during the years since the new Deer and Elk Harvest Survey system was implemented in 1971. My research into the matter reveals that there definitely has been a problem, which is traceable directly to the licensee population figures that were used to calculate the hunter and harvest estimates.

When this system was conceived, I assumed that practically all (95 percent or higher) of the deer and elk licensee data would be captured and available for sampling purposes by the middle of January, which was the annual target date for beginning the survey. Looking back, I have discovered that we have averaged only 88.5 percent of the total at this time (Table 1). Since these same figures were ultimately used in calculating hunter and harvest estimates, the magnitude of the bias has been approximately a negative 11.5 percent. This is an average figure for the four license categories composed of Res. Deer A, Res. Deer B, Res. Elk, and NR Big Game. Estimates involving Res. and NR Elk Permit licensees and NR $35/$36 Deer licensees have never been afflicted by this bias because all such licensees have always been available for sampling.

In order to at least partially set the record straight, I have recalculated the State and Region hunter and harvest estimates for each of the years 1971, 1972, and 1973 (Tables 2-25). The correction factors applied to each license category in each year are listed in Table 1 for the comparable periods and categories. These same figures may be used to recalculate individual district estimates if such a need arises.

This bias will be avoided in the future by using Department of Fish and Game license sales figures for each of Res. Deer A, Res. Deer B, Res. Elk, and NR Big Game in the calculation of hunter and harvest estimates. Although this may result in a slight loss of accuracy (normally less than 1 percent) due to the nature of the data, this is clearly preferable to the much more serious bias that we have been experiencing.

If you or any of your staff have further questions concerning this problem, or my proposed solution to it, please call me.

Sincerely,

Burwell

Burwell Gooch, Programmer III
Systems Development Bureau

Enclosures

TABLE 1 . Fish and Game license sales totals and numbers available for sampling in January of license years 1971, 1972, and 1973.

LICENSE YEAR	LICENSE CATEGORY	TOTAL SOLD	AVAILABLE IN JANUARY	PERCENT AVAILABLE	CORRECTION FACTOR
1971	Res. Deer A	135,363	119,357	88.2	1.134
	Res. Deer B	31,496	26,704	84.8	1.179
	Res. Elk *	75,715	68,886	91.0	1.099
	NR Big Game	11,973	11,158	93.2	1.073
	Total	254,547	226,105	88.8	-
1972	Res. Deer A	140,099	124,632	89.0	1.124
	Res. Deer B	37,903	32,137	84.8	1.179
	Res. Elk *	76,249	67,534	88.6	1.129
	NR Big Game	14,016	12,913	92.1	1.085
	Total	268,265	237,216	88.4	-
1973	Res. Deer A	154,999	137,233	88.5	1.129
	Res. Deer B	52,944	45,483	85.9	1.164
	Res. Elk *	85,049	75,590	88.9	1.125
	NR Big Game	19,277	17,581	91.2	1.096
	Total	312,269	275,887	88.3	-

*NON-PERMIT LICENSEES ONLY

TABLE 9 . Adjusted 1971 State Deer and Elk Hunter Harvest Estimates

DEER LICENSE TYPE	HUNTERS	HARVEST	PERCENT SUCCESS	Age and Sex			Species			HUNTER DAYS
				ANTLERED	ANTERLESS	UNK	MULE	WHITETAIL	UNK	
Res. Tag A	118472	75910	64	48528	25998	1384	53530	19748	2632	652889
Res. Tag B	23914	17089	71	10982	5692	415	11031	5094	964	94262
Res. Total	142386	92999	65	59510	31690	1799	64561	24842	3596	747151
NR Tag A	9496	7023	74	5176	1719	128	5796	906	321	55158
NR Tag B	5832	4538	78	3214	1262	62	3816	548	174	25092
NR Total	15328	11561	75	8390	2981	190	9612	1454	495	80250
Total Deer[1]	170989	116716	68	75463	39174	2079	83405	29153	4158	875615

ELK LICENSE TYPE	HUNTERS	HARVEST	PERCENT SUCCESS	Age and Sex					HUNTERS DAYS
				BULL	SPIKE	COW	CALF	UNK	
Res. Non-Permit	60335	9319	15	3535	2223	2456	781	324	445463
Total Res.[2]	60568	9397	16	3554	2233	2496	789	325	445881
NR Non-Permit	9740	2142	22	881	531	557	117	56	68954
Total NR[3]	9748	2147	22	883	534	557	117	56	68967
Total Elk	70316	11544	16	4437	2767	3053	906	381	514848

[1] INCLUDES NR $36 DEER WHICH IS UNCHANGED FROM ORIGINAL

[2] INCLUDES RES. ELK PERMIT WHICH ISUNCHANGED FROM OIRGINAL

[3] INCLUDES NR ELK PERMIT WHICH IS UNCHANGED FROM ORIGINAL

TABLE 17. Adjusted 1972 State Deer and Elk Hunter Harvest Estimates

DEER LICENSE TYPE	HUNTERS	HARVEST	PERCENT SUCCESS	Age and Sex			Species			HUNTER DAYS
				ANTLERED	ANTERLESS	UNK	MULE	WHITETAIL	UNK	
Res. Tag A	127817	69640	54	43891	24689	1060	48982	18718	1940	741778
Res. Tag B	29469	18442	63	10985	7127	330	12152	5206	1084	128222
Res. Total	157286	88082	56	54876	31816	1390	61134	23924	3024	870000
NR Tag A	11765	8241	70	6177	1960	104	7204	876	161	70193
NR Tag B	7662	5490	72	3723	1676	91	4450	727	314	36734
NR Total	19427	13731	71	9900	3636	195	11654	1603	475	106927
Total Deer[1]	189676	112996	60	71249	40091	1656	81551	27862	3584	1025673

ELK LICENSE TYPE	HUNTERS	HARVEST	PERCENT SUCCESS	Age and Sex					HUNTERS DAYS
				BULL	SPIKE	COW	CALF	UNK	
Res. Non-Permit	61496	7639	12	3017	1598	2059	684	281	463180
Total Res.[2]	63750	8442	13	3069	1651	2639	795	288	476609
NR Non-Permit	10638	1947	18	782	449	522	152	42	75462
Total NR[3]	10735	1994	19	785	451	557	158	43	76089
Total Elk	74485	10436	14	3854	2102	3196	953	331	552698

[1] INCLUDES NR $36 DEER WHICH UNCHANGED FROM ORIGINAL

[2] INCLUDES RES. ELK PERMIT WHICH IS UNCHANGED FROM OIRGINAL

[3] INCLUDES NR ELK PERMIT WHICH IS UNCHANGED FROM ORIGINAL

TABLE 25 . Adjusted 1973 State Deer and Elk Hunter Harvest Estimates

DEER LICENSE TYPE	HUNTERS	HARVEST	PERCENT SUCCESS	Age and Sex			Species			HUNTER DAYS
				ANTLERED	ANTERLESS	UNK	MULE	WHITETAIL	UNK	
Res. Tag A	138693	80896	58	47724	31504	1668	53353	24672	2871	806842
Res. Tag B	40712	25994	64	14356	10996	642	17147	7273	1574	171131
Res. Total	179405	106890	60	62080	42500	2310	70500	31945	4445	977973
NR Tag A	18283	12787	70	9152	3437	198	10745	1751	291	109807
NR Tag B	12159	8764	72	5493	3117	154	6988	1313	463	57566
NR Total	30442	21551	71	14645	6554	352	17733	3064	754	167373
Total Deer	220230	137441	62	81160	53598	2683	94986	37246	5209	1183825

ELK LICENSE TYPE	HUNTERS	HARVEST	PERCENT SUCCESS	Age and Sex					HUNTERS DAYS
				BULL	SPIKE	COW	CALF	UNK	
Res. Non-Permit	69717	12333	18	4220	2915	3383	1260	555	517860
Total Res.	72199	13547	19	4299	2996	4225	1452	575	532123
NR Non-Permit	15381	3263	21	1118	841	836	311	157	108673
Total NR	15547	3343	22	1123	844	900	318	158	109592
Total Elk	87746	16890	19	5422	3840	5125	1770	733	641715

APPENDIX C

STATE OF MONTANA

DEPARTMENT OF FISH AND GAME

HELENA, MONTANA

Office Memorandum

TO : Regional Coordinators, Attn: Game Managers DATE: September 16, 1974

FROM : Wesley R. Woodgerd By: Wynn Freeman
By: John Weigand

SUBJECT: 1973 Upland Game Bird
Harvests -- Revised Figures

Due to several unrealistic species harvests projected from 1973 harvest questionnaire respondents, a list of individual hunter responses was printed and reviewed. A total of 183 questionable entries, keypunch and program errors were discovered among the 7,500 (est.) responses. These were corrected or deleted and a new, revised harvest was determined.

You may want to compare the previous (April 15, 1974) with new results but the previous printouts should then be destroyed.

The revised harvests represent the most accurate projections which can be made within the limitations of the actual questionnaire (sent to hunters) and of the programs analyzing the respondent's data.

JPW:mms
cc: Richard P. Weckwerth
Reuel G. Janson
Arnold J. Foss
James L. Mitchell
H. O. (Buck) Compton
Richard W. Trueblood
Neil S. Martin

Eugene O. Allen

JOB PROGRESS REPORT

State: Montana

Project No.: W-104-R-8 Project Title: Wildlife Statistical Services

Job Nos.: 1 & 2 Job Title: Statewide Wildlife Harvest - (Job 1) and Statewide Statistical Services (Job 2)

Period Covered: July 1, 1971 through June 30, 1972

NOTE: Since this is a Progress Report only, results presented herein are not necessarily final and may be subject to change. For this reason, the information contained in this report may not be published or used for other purposes without permission of the Director of the Montana Department of Fish and Game.

Abstract:

Game harvest surveys were conducted using standardized questionnaires and computer programs to estimate harvests. Statewide game harvest estimates for the report period are presented. Regional game harvests are reported in the Game Survey and Inventory Reports of each district job under Project W-130-R.

Statistical services were provided to game research projects. Data processing services were the primary contribution to Job 2, Statewide Statistical Services. Analysis of these research data appear in the several reports for Federal Aid Projects W-105-R, W-120-R, and certain other reports.

Recommendations:

The services of Project W-104-R should be continued. The game and fur harvest mail surveys will be reviewed, revised and updated on a continuing basis. Statistical services and data processing services are required by the game research projects and work progress is expected to develop an increased need of these services.

Procedures:

Game harvest mail questionnaire supplies were printed and later mailed on a schedule after the hunting seasons closed. The returned questionnaires were edited and submitted to the Data Processing Bureau for recording. Reminder cards were sent to nonrespondents to increase the return of questionnaires. Estimates of the number of hunters, game killed and hunter success were obtained by analyses according to previously prepared programs available at the State Data Processing Bureau. Harvest results were given appropriate distribution and the required records were maintained.

Game research data were tabulated at the Data Processing Bureau for later analyses. Wing envelope survey data were analyzed and distributed to the Regional Survey and Inventory Projects. Results of these services were presented in appropriate research project progress reports.

Findings:

During the report period, the format of the elk-deer-black bear questionnaire was revised, as was the method of analysis. The Data Processing Bureau (State Department of Administration) was contracted to review the elk-deer-bear survey and offer recommendations for improvement. The report "Deer, Elk, and Bear Harvest Survey: A Review of the Current Program and Recommendations for Improvement," by Burwell Gooch, April 1971, provided the basis for changes. This report is on file in the Game Management Division, Helena Office.

The four questionnaires used each for moose, mountain goat, mountain sheep, and antelope, were also revised and consolidated into a single questionnaire.

The several upland bird, waterfowl and turkey harvest questionnaires were also revised as to format and consolidated into a single questionnaire. At this time we use the following questionnaires:

Either-sex elk permit holders
Archers (big game)
$35 nonresident deer
Trappers
Moose-sheep-goat-antelope
Deer-elk-bear
Upland birds - pheasants - waterfowl - turkeys

We also use a questionnaire for swan permit holders. In the case of the moose-sheep-goat-antelope questionnaire, data processing machines print the species involved as well as the hunting district on the questionnaire to identify it as to type. The name and address of the recipient is also printed at the same time.

At the end of the report period the new formats, methods of analysis, and assorted other improvements made in the overall Hunter Harvest Survey seem to be working very satisfactorily.

During the report period the following questions were sent:

Questionnaire Name	Initial	Reminder	Total Sent
1971 Upland & Migratory Game Bird	10,027	4,632	14,659
1971 Turkey	1,214	560	1,774
1971 Special Big Game -			
Moose	700	212	912
Sheep	556	188	744
Goat	910	277	1,187
Antelope	4,970	1,673	6,643
1971 Deer, Elk, Bear			
Nonresident Permit	54,563	25,152	79,715
Elk Permit	263	108	371
$35 Nonresident Deer	2,416	744	3,160
1971 Fur Trapper			
General	773	330	1,103
Landowners	81	33	114
1971 Archery	1,581	787	2,368

Separate mail surveys were sent out to selected license holders to estimate the harvest and certain other data concerning antelope, moose, mountain sheep, mountain goat, deer, elk, bear, upland game birds, turkey and waterfowl. An archery survey was also conducted to estimate days spent hunting certain big game species, as well as numbers taken.

Average number of days spent hunting the various species, including archers, is given in Table 1.

The official report of big game harvested in Montana during 1971 is given in Table 2. The estimates are all from the mail survey except the grizzly bear harvest, which was determined by the number of trophy licenses issued.

The detailed statewide game harvest survey results showing confidence limits of estimated hunters and animals killed for the period 1968-71 of big game (Table 3) and upland birds, (Table 4) are part of this report. The harvest of fur animals and waterfowl are reported as jobs in the Statewide Wildlife Survey and Inventory Project W-130-R.

The results of game research data handled by the Data Processing Bureau have been reported under other appropriate projects.

Prepared by: Joseph L. Egan. Approved by: Wynn G. Freeman

Joseph L. Egan

Date: July 30, 1973

July 30, 1973

TABLE 1. Average number of days spent by Montana hunters, statewide, hunting certain game species.

	Year	Deer A Tag	Deer B Tag	Elk	Upland Birds	Turkey	Archery Deer	Archery Elk	Archery Antelope
Days Hunted	1968	4.5	3.8	7.2	5.5	1.8	5.1	4.0	2.1
	1969	4.7	3.9	7.0	5.9	1.7	5.2	3.7	2.0
	1970	4.8	3.7	6.9	6.1	1.8	5.6	4.2	1.8
	1971	5.5	3.9	7.3	6.0	1.4	5.7	4.6	2.8

	Year	Antelope	Mt. Goat	Bighorn Sheep	Moose
Days Hunted	1969	2.0	4.0	7.6	-
	1970	2.0	-	-	-
	1971	3.0	4.3	7.2	6.3

TABLE 2. 1971 Montana Big Game Harvest*

Mule Deer	78,270**	
White-tailed Deer	26,090	
Total Deer		104,360
Elk	11,590	
Antelope	18,400	
Moose	480	
Sheep	90	
Goat	300	
Black Bear	***	
Grizzly Bear	22	

* Estimated by mail survey
** Survey figures "rounded off" to nearest zero
*** 1971 data not analyzed

TABLE 3. Montana big game harvests, statewide, 1968-71.

Species & Year	No. Licenses		Number of Hunters				Number Killed				% Success	
	Lim.	Unlim.	Low	Point	High	Unlim.	Low	Point	High	Unlim.	Lim.	Unlim.
Deer:												
1968		159,152	125,203	125,711	126,219		98,123	99,250	100,377			79
1969		167,341	127,617	128,177	128,738		101,634	102,826	104,018			80
1970		184,899	136,208	136,903	137,598		109,231	110,508	111,784			81
1971		185,594	151,973	152,316*	152,659		103,893	104,365	104,837			69
Elk:												
1968		88,324	79,156	79,623	80,090		15,983	16,712	17,441			21
1969		83,986	73,373	73,848	74,322		11,498	12,082	12,666			16
1970		87,327	77,271	77,819	78,368		13,364	13,988	14,611			18
1971		89,334	63,982	64,218**	64,454		10,363	10,559**	10,755			16
Antelope:												
1968	18,358		15,986	16,150	16,314		11,287	11,500	11,714		71	
1969	23,167		19,659	19,871	20,082		14,251	14,543	14,834		73	
1970	26,838		23,452	23,697	23,941		17,676	18,023	18,370		76	
1971	28,636		24,402	24,802	25,201		17,856	18,403	18,949		74	
Moose:												
1968	659		635	643	651		434	457	480		71	
1969	668		642	645	648		448	457	466		71	
1970	708		669	673	677		516	523	530		78	
1971	700		674	677	680		465	474	483		70	
Bighorn Sheep:												
1968	78	215	71	75	78	186	48	55	63	13	74	7
1969	80	279	76	77	78	241	48	50	52	17	65	7
1970	63	447	57	59	61	447	40	43	46	31	73	7
1971	66	980	64	64	64	452	48	50	52	40	78	9
Mountain Goat:												
1968	700	298	579	598	618	207	237	263	289	29	44	14
1969	630	266	537	543	549	213	258	267	276	66	49	31
1970	670	305	573	580	587	223	293	303	313	51	52	23
1971	673	273	541	547	553	215	229	238	247	59	44	27

* The figure 152,316 represents the point estimate of the total number of the various kinds of deer licenses sold. The point estimate of actual numbers of hunters would be approximately 126,598.

** Does not include those under special Either-sex permit. Inclusion of special Either-sex permit increases point estimate of hunters to 66,239 and harvest to 11,586.

TABLE 3. Montana big game harvests, statewide, 1968-1971 - (continued).

Species & Year	No. Licenses		Number of Hunters				Number Killed				% Success	
	Lim.	Unlim.	Low	Point	High	Unlim.	Low	Point	High	Unlim.	Lim.	Unlim.
Black Bear:												
1968		*	7,780	8,287	8,794		1,708	1,950	2,192			24
1969		*	8,250	8,787	9,324		1,499	1,735	1,972			20
1970		*	6,707	7,204	7,700		906	1,079	1,252			15
1971		Data collected but not analyzed					-	-	-			-
Archery:												
1970		4,632		3,774								
1971		5,370		4,516								
Deer 1970			3,310	3,438	3,566		355	441	526			13
1971			3,915	4,066	4,217		482	593	705			15
Elk 1970			1,638	1,780	1,922		10	29	52			2
1971			2,033	2,208	2,383		21	57	94			3
Antelope 1970			153	214	276		10	35	60			16
			163	236	309		0	7	20			3

* A specific bear license was not required.

TABLE 4. Montana upland game bird harvest, statewide, 1968-1971.

Year	Number Licenses	Number Hunters	Total Birds	Pheasant	Sharptail	Sage Grouse	Blue Grouse	Ruffed Grouse	Franklin Grouse	Hungarian Partridge	Chukar
Upland Game Birds:											
1968	68,253	48,548	372,000	95,200	66,800	29,600	40,600	44,700	21,700	70,200	3,200
1969	60,080	50,842	441,500	114,528	99,776	54,201	40,980	38,763	19,455	69,088	2,956
1970	60,275	41,478	353,361	96,303	73,033	36,879	38,035	36,694	20,122	49,563	1,327
1971	61,036	34,348	332,425	90,643	78,549	40,574	30,454	34,348	17,200	36,660	2,260
Turkeys:											
1968	1,601	1,348	400								
1969	1,592	1,298	360								
1970	1,262	946	250								
1971	1,679	1,196	547								

JOB PROGRESS REPORT

SURVEY AND INVENTORY PROJECT

State Montana

Project No. W-104-R-9 Title Wildlife Statistical Services

Job No. 1 & 2 Job Title Statewide Wildlife Harvest - (Job 1) and Statewide Statistical Services (Job 2)

Period Covered July 1, 1972 through June 30, 1973

Abstract: Game harvest surveys were conducted using standardized questionnaires and computer programs to estimate harvests. Statewide game harvest estimates for the report period are presented. Regional game harvests are reported in the Game Survey and Inventory Reports of each regional job under Project W-130-R.

Statistical services were provided to game research projects. Data processing services were the primary contribution to Job 2, Statewide Statistical Services. Analysis of these research data appear in the several reports for Federal Aid Projects W-105-R, W-120-R, and certain other reports.

Recommendations: The services of Project W-104-R should be continued. The game and fur harvest mail surveys will be reviewed, revised and updated on a continuing basis. The statistical services and data processing services are required by the game research projects and work progress is expected to develop an increased need of these services.

Procedures: Game harvest mail questionnaire supplies were printed and later mailed on a schedule after the hunting seasons closed. The returned questionnaires were edited and submitted to the Data Processing Bureau for recording. Reminder cards were sent to nonrespondents to increase the return of questionnaires. Estimates of the number of hunters, game killed and hunter success were obtained by analyses according to previously prepared programs available at the State Data Processing Bureau. Harvest results were given appropriate distribution and the required records were maintained.

Game research data were tabulated at the Data Processing Bureau for later analyses. Wing envelope survey data were analyzed and distributed to the Regional Survey and Inventory Projects. Results of these services were presented in appropriate research project progress reports.

Findings: During the report period the black bear portion of the deer-elk bear harvest survey was done separately. Analysis procedures were also conducted separately. During the report period, minor changes were made in the analysis procedures of the data collected from the elk-deer questionnaire.

At this time, we use the following questionnaires:

Either-sex elk (permit holders)
Archers (big game)
$35 nonresident deer
Trappers
Moose-sheep-goat-antelope
Deer-elk
Upland birds (pheasants - waterfowl - turkeys)
Black bear

We also use a questionnaire for swan permit holders. In the case of the moose-sheep-goat-antelope questionnaire, data processing machines print the species involved as well as the hunting district on the questionnaire to identify it as to type. The name and address of the recipient is also printed at the same time.

During the report period the following questionnaires were sent:

Questionnaire Name	Initial	Reminder	Total Sent
1972 Upland & Migratory Game Bird	10,016	4,700	14,716
1972 Turkey	1,217	494	1,711
1972 Special Big Game			
Moose	673	168	841
Sheep	600	159	759
Goat	663	181	844
Antelope	4,481	1,358	5,839
1972 Deer & Elk			
Nonpermit	58,832	28,426	87,258
Elk Permit	2,979	(	3,585
$35 Nonresident Deer	2,132	(606 *	2,738
1972 Fur Trapper			
General	1,046		1,524
Landowners	92	386*	
1972 Archery	1,858	944	2,802
1972 Black Bear	5,862	2,863	8,725

* not broken down

Separate mail surveys were sent out to selected license holders to estimate the harvest and certain other data concerning antelope, moose, mountain sheep, mountain goat, deer, elk, bear, upland game birds, turkey and waterfowl. An archery survey was also conducted to estimate days spent hunting certain big game species, as well as numbers taken.

Average number of days spent hunting the various species, including archers, is given in Table 1.

The official report of big game harvested in Montana during 1972 is given in Table 2. The estimates are all from the mail survey except the grizzly bear harvest, which was determined by the number of trophy licenses issued.

The detailed statewide game harvest survey results showing confidence limits of estimated hunters and animals killed for the period 1968-72 of big game (Table 3) and upland birds, (Table 4) are part of this report. The harvest of fur animals and waterfowl are reported as jobs in the Statewide Wildlife Survey and Inventory Project W-130-R.

The results of game research data handled by the Data Processing Bureau have been reported under other appropriate projects.

Prepared by: Joseph L. Egan Approved by: Wynn G. Freeman

Joseph L. Egan

Date: March 8, 1974

TABLE 1. Average number of days spent by Montana hunters, statewide, hunting certain game species

	Year	Deer A Tag	Deer B Tag	Elk	Upland Birds	Turkey	Archery Deer	Archery Elk	Archery Antelope
Days Hunted	1968	4.5	3.8	7.2	5.5	1.8	5.1	4.0	2.1
	1969	4.7	3.9	7.0	5.9	1.7	5.2	3.7	2.0
	1970	4.8	3.7	6.9	6.1	1.8	5.6	4.2	1.8
	1971	5.5	3.9	7.3	6.0	1.4	5.7	4.6	2.8
	1972	5.8	4.4	7.3	6.0	1.6	6.2	5.2	3.5

		Antelope	Mountain Goat	Bighorn Sheep	Moose
Days Hunted	1969	2.0	4.0	7.6	-
	1970	2.0	-	-	-
	1971	3.0	4.3	7.2	6.3
	1972	2.0	4.2	7.9	6.4

TABLE 2. 1972 Montana Big Game Harvest*

Mule Deer	75,764**	
White-tailed Deer	25,673	
Total Deer		101,437
Elk	9,842	
Antelope	19,712	
Moose	427	
Sheep	104	
Goat	234	
Black Bear	928	
Grizzly Bear	35	

* Estimated by mail survey
** Survey figures "rounded off" to nearest zero

TABLE 3. Montana big game harvests, statewide, 1968-72

Species	Year	Number of Licenses Lim.	Number of Licenses Unlim.	Number of Hunters Low	Number of Hunters Point	Number of Hunters High	Number of Hunters Unlim.	Number Killed Low	Number Killed Point	Number Killed High	Number Killed Unlim.	% Success Lim.	% Success Unlim.
Deer:	1968		159,152	125,203	125,711	126,219		98,123	99,250	100,377			79
	1969		167,341	127,617	128,177	128,738		101,634	102,826	104,018			80
	1970		184,899	136,208	136,903	137,598		109,231	110,508	111,784			81
	1971		192,573	151,973	152,316*	152,659		103,893	104,365	104,837			69
	1972		205,568	169,244	169,579	169,914		100,951	101,437	101,923			60
Elk:	1968		88,324	79,156	79,623	80,090		15,983	16,712	17,441			21
	1969		83,986	73,373	73,848	74,322		11,498	12,082	12,666			16
	1970		87,327	77,271	77,819	78,368		13,364	13,988	14,611			18
	1971		89,334	63,982	64,218**	64,454		10,363	10,559**	10,755			16
	1972		95,512	66,376	66,625	66,874		9,220	9,411***	9,602			14
Antelope:	1968	18,358		15,986	16,150	16,314		11,287	11,500	11,714		71	
	1969	23,167		19,659	19,871	20,082		14,251	14,543	14,834		73	
	1970	26,838		23,452	23,697	23,941		17,676	18,023	18,370		76	
	1971	28,636		24,402	24,802	25,201		17,856	18,403	18,949		74	
	1972	32,271		21,982	22,463	22,943		14,885	15,488	16,090		69	
Moose:	1968	659		635	643	651		434	457	480		71	
	1969	668		642	645	648		448	457	466		71	
	1970	708		669	673	677		516	523	530		78	
	1971	700		674	677	680		465	474	483		70	
	1972	641		615	619	623		400	408	416		66	
Bighorn Sheep:	1968	78	250	71	75	78	186	48	55	63	13	74	7
	1969	80	279	76	77	78	241	48	50	52	17	65	7
	1970	63	447	57	59	61	447	40	43	46	31	73	7
	1971	66	490	64	64	64	452	48	50	52	40	78	9
	1972	70	531	71	71	71	574	49	50	51	54	70	9
Mountain Goat:	1968	700	312	579	598	618	207	237	263	289	29	44	14
	1969	630	266	537	543	549	213	258	267	276	66	49	31
	1970	670	305	573	580	587	223	293	303	313	51	52	23
	1971	637	273	541	547	553	215	229	238	247	59	44	27
	1972	664	0	538	546	554	0	225	234	243	0	43	0

TABLE 3. (contd.) Montana big game harvests, statewide 1968-72

Species	Year	Number of Licenses Lim.	Unlim.	Number of Hunters Low	Point	High	Unlim.	Number Killed Low	Point	High	Unlim.	% Success Lim.	Unlim.
Black Bear:	1968		****	7,780	8,287	8,794		1,708	1,950	2,192			24
	1969		****	8,250	8,787	9,324		1,499	1,735	1,972			20
	1970		****	6,707	7,204	7,700		906	1,079	1,252			15
	1971	2,884		4,952	5,105	5,258		1,109	1,185	1,261			23
	1972	4,941		3,347	3,382	3,417		899	928	957			27
Archery:	1970		4,632		3,774								
	1971		5,370		4,516								
	1972		6,579		5,305								
Deer:	1970			3,310	3,438	3,566		355	441	526			13
	1971			3,915	4,066	4,217		482	593	705			15
	1972			4,614	4,794	4,473		401	511	622			11
Elk:	1970			1,638	1,780	1,922		10	29	52			2
	1971			2,033	2,208	2,383		21	57	94			3
	1972			2,762	2,966	3,170		33	77	122			3
Antelope:	1970			153	214	276		10	35	60			16
	1971			163	236	309		0	7	20			3
	1972			324	426	528		0	23	48			6

* The figure 152,316 represents the point estimate of the total number of the various kinds of deer licenses sold. The point estimate of actual numbers of hunters would be approximately 126,598.

** Does not include those under special either-sex permit. Inclusion of special either-sex permit increases point estimate of hunters to 66,239 and harvest to 11,586.

*** Does not include late season hunts.

**** A specific bear license was not required.

TABLE 4. Montana upland game bird harvest, statewide, 1968-1972.

Year	Number Licenses	Number Hunters	Total Birds	Pheasant	Sharptail	Sage Grouse	Blue Grouse	Ruffed Grouse	Franklin Grouse	Hungarian Partridge	Chukar
Upland Game Birds:											
1968	68,253	48,548	372,000	95,200	66,800	29,600	40,600	44,700	21,700	70,200	3,200
1969	60,080	50,842	441,500	114,528	99,776	54,201	40,980	38,763	19,455	69,088	2,956
1970	60,275	41,478	353,361	96,303	73,033	36,879	38,035	36,694	20,122	49,563	1,327
1971	61,036	34,348	332,425	90,643	78,549	40,574	30,454	34,348	17,200	36,660	2,260
1972	65,481	39,500	339,395	68,138	76,544	43,067	41,186	50,014	24,772	32,626	2,253
Turkeys:											
1968	1,601	1,348	400								
1969	1,592	1,298	360								
1970	1,262	946	250								
1971	1,679	1,196	547								
1972	2,238	1,223	444								

JOB PROGRESS REPORT

State: Montana

Project No.: W-104-R-7 Project Title: Wildlife Statistical Services

Job Nos.: 1 & 2 Job Title: Statewide Wildlife Harvest Census - (Job 1) and Statewide Statistical Services (Job 2)

Period Covered: July 1, 1970 through June 30, 1971

ABSTRACT:

The game harvest surveys were conducted using standardized questionnaires and computer programs prepared previous to estimate harvests. The statewide game harvest estimates for the period of 1968-1970 were tabulated as a part of this report. Regional game harvests were reported in the Game Survey and Inventory Reports of each district job under Project W-130-R-2.

Analysis of these data appear in the several reports for Federal Aid Projects W-105-R, W-120-R, and certain other reports. Statistical services were provided to game research projects. Data processing services were the primary contribution to Job 2, Statewide Statistical Services.

RECOMMENDATIONS:

The services of Project W-104-R should be continued. The game harvest and fur harvest mail surveys need further review, revision and updating. This is being done on a continuing basis. Statistical services and data processing services are required by the game research projects and work progress is expected to develop an increased need of these services.

PROCEDURES:

Game harvest mail questionnaire supplies were printed and later mailed on a schedule after the hunting seasons closed. The returned questionnaires were edited and submitted to the Data Processing Center for recording. Reminder cards were sent to nonrespondents to increase the return of questionnaires. Estimates of the number of hunters, game killed and hunter success were obtained by analyses according to previously prepared programs available at the State Data Processing Center. Harvest results were given appropriate distribution and the required records were maintained.

Game research data were tabulated at the Data Processing Center for later analyses. Wing envelope survey data were analyzed and distributed to the District Survey and Inventory Projects. Results of these services were given in appropriate research project progress reports.

FINDINGS:

Separate mail surveys were sent out to selected license holders to estimate the harvest of antelope, moose, mountain sheep, mountain goat, big game (deer, elk and bear), upland game birds, turkey and waterfowl. An archery survey was conducted and an estimate of days spent hunting certain big game species (Table 1), was expanded in 1969 to include additional game species.

The official report of big game harvested in Montana during 1970 is given in Table 2. The estimates are all from the mail survey except the grizzly bear harvest which was determined by the number of trophy licenses issued.

The detailed statewide game harvest survey results showing confidence limits of estimated hunters and animals killed for the period 1968-1970 of big game (Table 3) and upland birds, (Table 4) are part of this report. The harvest of fur animals and waterfowl are reported as jobs of the Statewide Wildlife Survey and Inventory Project W-130-R-1.

The results of game research data handled by the Data Processing Center have been reported under other appropriate projects.

Prepared by: Joseph L. Egan. Approved by: Wynn G. Freeman

Joseph L. Egan

Date: May 10, 1972

TABLE 1. Average number of days spent by Montana hunters, statewide, hunting certain game species, 1970.

	Year	Deer A Tag	Deer B Tag	Elk	Upland Birds	Turkey	Archery Deer	Archery Elk	Archery Antelope
Days Hunted	1968	4.5	3.8	7.2	5.5	1.8	5.1	4.0	2.1
	1969	4.7	3.9	7.0	5.9	1.7	5.2	3.7	2.0
	1970	4.8	3.7	6.9	6.1	1.8	5.6	4.2	1.8

		Antelope	Mt. Goat	Bighorn Sheep
Days Hunted	1969	2.0	4.0	7.6
	1970	2.0	-	-

TABLE 2. 1970 Montana big game harvest*

Mule Deer	85,100**	
White-tailed Deer	25,400	
Total Deer		110,500
Elk	14,000	
Antelope	17,500	
Moose	520	
Sheep	70	
Goat	350	
Black Bear	1,050	
Grizzly Bear	13	
Total Bear		1,063
TOTAL BIG GAME	144,003	

* Estimated by mail survey.
** Survey figures "rounded off" to nearest zero.

TABLE 3. Montana big game harvests, statewide, 1968-1970.

Species & Year	No. Licenses		Number of Hunters				Number Killed				% Success	
	Lim.	Unlim.	Low	Point	High	Unlim.	Low	Point	High	Unlim.	Lim.	Unlim.
Deer:												
1968		159,152	125,203	125,711	126,219		98,123	99,250	100,377			79
1969		167,341	127,617	128,177	128,738		101,634	102,826	104,018			80
1970		184,899	136,208	136,903	137,598		109,231	110,508	111,784			81
Elk:												
1968		88,324	79,156	79,623	80,090		15,983	16,712	17,441			21
1969		83,986	73,373	73,848	74,322		11,498	12,082	12,666			16
1970		87,327	77,271	77,819	78,368		13,364	13,988	14,611			18
Antelope:												
1968	18,358		15,986	16,150	16,314		11,287	11,500	11,714		71	
1969	23,167		19,659	19,871	20,082		14,251	14,543	14,834		73	
1970	26,838		23,452	23,697	23,941		17,676	18,023	18,370		76	
Moose:												
1968	659		635	643	651		434	457	480		71	
1969	668		642	645	648		448	457	466		71	
1970	708		669	673	677		516	523	530		78	
Bighorn Sheep:												
1968	78	215	71	75	78	186	48	55	63	13	74	7
1969	80	279	76	77	78	241	48	50	52	17	65	7
1970	63	447	57	59	61	447	40	43	46	31	73	7
Mountain Goat:												
1968	700	298	579	598	618	207	237	263	289	29	44	14
1969	630	266	537	543	549	213	258	267	276	66	49	31
1970	670	305	573	580	587	223	293	303	313	51	52	23

TABLE 3. Montana big game harvests, statewide, 1968-1970 - (Continued).

Species & Year	No. Licenses		Number of Hunters				Number Killed				% Success	
	Lim.	Unlim.	Low	Point	High	Unlim.	Low	Point	High	Unlim.	Lim.	Unlim.
Black Bear:												
1968		*	7,780	8,287	8,794		1,708	1,950	2,192			24
1969		*	8,250	8,787	9,324		1,499	1,735	1,972			20
1970		*	6,707	7,204	7,700		906	1,079	1,252			15
Archery: 1970		4,632		3,774								
Deer			3,310	3,438	3,566		355	441	526			13
Elk			1,638	1,780	1,922		10	29	52			2
Antelope			153	214	276		10	35	60			16

* A specific bear license was not required.

TABLE 4. Montana upland game bird harvest, statewide, 1968-1970.

Year	Number Licenses	Number Hunters	Total Birds	Pheasant	Sharptail	Sage Grouse	Blue Grouse	Ruffed Grouse	Franklin Grouse	Hungarian Partridge	Chukar
Upland Game Birds:											
1968	68,253	48,548	372,000	95,200	66,800	29,600	40,600	44,700	21,700	70,200	3,200
1969	60,080	50,842	441,500	114,528	99,776	54,201	40,980	38,763	19,455	69,088	2,956
1970	60,275	41,478	353,361	96,303	73,033	36,879	38,035	36,694	20,122	49,563	1,327
Turkeys:											
1968	1,601	1,348	400								
1969	1,592	1,298	360								
1970	1,262	946	250								

JOB PROGRESS REPORT

State: Montana

Project No.: W-104-R-6 Project Title: Wildlife Statistical Services

Job Nos.: 1 & 2 Job Title: Statewide Wildlife Harvest Census - (Job 1) and Statewide Statistical Services (Job 2)

Period Covered: July 1, 1969 through June 30, 1970

ABSTRACT:

The game harvest surveys were conducted using standardized questionnaires and computer programs prepared previous to estimate harvests. The statewide game harvest estimates for the period of 1967-1969 were tabulated as a part of this report. Regional game harvests were reported in the Game Survey and Inventory Reports of each district job under Project W-130-R-1.

A limited amount of statistical services was provided to game research projects. Data processing services were the primary contribution to Job 2, Statewide Statistical Services.

RECOMMENDATIONS:

The services of Project W-104-R should be continued. The game harvest and fur harvest mail surveys need further review, revision and updating. Statistical services and data processing services are required by the game research projects and work progress is expected to develop an increased need of these services.

PROCEDURES:

Game harvest mail questionnaire supplies were printed and later mailed on a schedule after the hunting seasons closed. The returned questionnaires were edited and submitted to the Data Processing Center for recording. Reminder cards were sent to nonrespondents to increase the return of questionnaires. Estimates of the number of hunters, game killed and hunter success were obtained by analyses according to previously prepared programs available at the State Data Processing Center. Harvest results were given appropriate distribution and the required records were maintained.

Game research data were tabulated at the Data Processing Center for later analyses. Wing envelope survey data were analyzed and distributed to the district survey and inventory projects. Results of these services were given in appropriate research project progress reports.

FINDINGS:

Separate mail surveys were sent out to selected license holders to estimate the harvest of antelope, moose, mountain sheep, mountain goat, big game (deer, elk and bear), upland game birds, turkey and waterfowl. An archery survey was

conducted and an estimate of days spent hunting certain big game species (Table 1), was expanded in 1969 to include additional game species.

The official report of big game harvested in Montana during 1969 is given in Table 2. The estimates are all from the mail survey except the grizzly bear harvest which was determined by the number of trophy licenses issued.

The detailed statewide game harvest survey results showing confidence limits of estimated hunters and animals killed for the period 1967-1969 of big game (Table 3) and upland birds, (Table 4) are part of this report. The harvest of fur animals and waterfowl are reported as jobs of the Statewide Wildlife Survey and Inventory Project W-130-R-1.

The results of game research data handled by the Data Processing Center have been reported under other appropriate projects.

Prepared by: Merle J. Regnrud Approved by: Wynn G. Freeman

Merle J. Regnrud

Date: April 12, 1971

TABLE 1. Average number of days spent by Montana hunters, statewide, hunting certain game species, 1969

	Year	Deer A Tag	Deer B Tag	Elk	Upland Birds	Turkey	Archery Deer	Archery Elk	Archery Antelope
Days Hunted	1968	4.5	3.8	7.2	5.5	1.8	5.1	4.0	2.1
	1969	4.7	3.9	7.0	5.9	1.7	5.2	3.7	2.0

	Year	Antelope	Mt. Goat	Bighorn Sheep
Days Hunted	1969	2.0	4.0	7.6

TABLE 2. 1969 Montana big game harvest *

Mule Deer	79,800	
White-tailed Deer	23,000	
Total Deer		102,800
Elk	12,100	
Antelope	14,500	
Moose	460	
Sheep	70	
Goat	330	
Black Bear	1,700	
Grizzly Bear	33	
Total Bear		1,733
TOTAL BIG GAME	131,993	

* Estimated by mail survey

TABLE 3. Montana big game harvests, statewide, 1967-1969.

Species & Year	No. Licenses		Number of Hunters				Number Killed				% Success	
	Lim.	Unlim.	Low	Point	High	Unlim.	Low	Point	High	Unlim.	Lim.	Unlim.
Deer:												
1967		151,131	114,664	115,185	115,706		87,522	88,640	89,757			77.0
1968		159,152	125,203	125,711	126,219		98,123	99,250	100,377			79.0
1969		167,341	127,617	128,177	128,738		101,634	102,826	104,018			80.3
Elk:												
1967		82,882	71,384	71,883	72,382		14,447	15,190	15,934			21.2
1968		88,324	79,156	79,623	80,090		15,983	16,712	17,441			21.0
1969		83,986	73,373	73,848	74,322		11,498	12,082	12,666			16.4
Antelope:												
1967	19,933		17,614	18,052	18,489		12,407	12,599	12,791		69.8	
1968	18,358		15,986	16,150	16,314		11,287	11,500	11,714		71.3	
1969	23,167		19,659	19,871	20,082		14,251	14,543	14,834		73.2	
Moose:												
1967	631		607	616	624		409	433	456		70.4	
1968	659		635	643	651		434	457	480		71.1	
1969	668		642	645	648		448	457	466		70.9	
Bighorn Sheep:												
1967	80	184	75	78	80	145	48	56	65	12	72.5	8.3
1968	78	215	71	75	78	186	48	55	63	13	74.3	7.0
1969	80	279	76	77	78	241	48	50	52	17	64.9	7.1
Mountain Goat:												
1967	681	300	570	589	608	256	268	294	321	90	50.0	35.0
1968	700	298	579	598	618	207	237	263	289	29	44.0	14.0
1969	630	266	537	543	549	213	258	267	276	66	49.2	31.0

TABLE 3. Montana big game harvests, statewide, 1967-1969. (Continued)

Species & Year	No. Licenses		Number of Hunters				Number Killed				% Success	
	Lim.	Unlim.	Low	Point	High	Unlim.	Low	Point	High	Unlim.	Lim.	Unlim.
Black Bear:												
1967		*	9,943	10,571	11,198		1,827	2,096	2,366			19.9
1968		*	7,780	8,287	8,794		1,708	1,950	2,192			23.6
1969		*	8,250	8,787	9,324		1,499	1,735	1,972			19.8
Archery 1969:		3,390	1,961	2,017	2,073							
Deer			1,680	1,737	1,795		231	260	289			15.0
Elk			884	935	986		44	58	73			6.2
Antelope			78	97	116		0	0	0			0

* A specific bear license was not required.

TABLE 4, Montana upland game bird harvest, statewide, 1967-1969

Year	Number Licenses	Number Hunters	Total Birds	Pheasant	Sharptail	Sage Grouse	Blue Grouse	Ruffed Grouse	Franklin Grouse	Hungarian Partridge	Chukar
Upland Game Birds:											
1967	66,617	46,712	432,700	97,100	79,100	29,500	51,000	67,500	35,500	70,600	2,400
1968	68,253	48,548	372,000	95,200	66,800	29,600	40,600	44,700	21,700	70,200	3,200
1969	60,080	50,842	441,500	114,528	99,776	54,201	40,980	38,763	19,455	69,088	2,956
Turkeys:											
1967	1,457	1,185	300								
1968	1,601	1,348	400								
1969	1,592	1,298	360								

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT

State of Montana

Project No. W-104-R-5

Name Statewide Wildlife Harvest Census and Statewide Statistical Services

Job Nos. 1 & 2

Title Statewide Wildlife Harvest Census (and) Statewide Wildlife Statistical Services

Period Covered: July 1, 1968 through June 30, 1969

Abstract: The Department statistician position remained vacant during the project year. The game harvest surveys were again conducted using standardized questionnaires and computer programs prepared previously. The statewide game harvest estimates for the period 1966-1968 were tabulated as a part of this report. Regional game harvests were reported in the game survey reports of each district project (W-71-R through W-77-R).

A limited amount of statistical services were provided by the project. Data processing services were the primary contribution to Job 2, Statewide Statistical Services.

Recommendations: The services of Project W-104-R should be continued. The game harvest and fur harvest mail surveys need review and possible revision and updating. Statistical services and data processing services are required by the game research projects and work progress is expected to develop an increased need of these services.

Procedures: Game harvest mail questionnaire supplies were requisitioned and then mailed on a schedule after the various hunting seasons closed. The returned questionnaires were edited and submitted to the data processing center for recording. Estimates of the number of hunters, game killed and hunter success were obtained by analyses according to previously prepared programs available at the data processing center. Harvest results were given appropriate distribution and the required records were maintained.

Game research data were tabulated at the data processing center for later analyses. Wing envelope survey data were analyzed and distributed to the district survey and inventory projects.

Findings: Separate mail surveys were sent out to license holders to estimate the harvest of antelope, moose, mountain sheep, mountain goat, deer, elk, bear, upland game birds, turkey and waterfowl. An archery survey was conducted and for the first time an estimate of days spent hunting certain big game species (Table 1) was obtained in 1968.

The statewide game harvest survey results for the period 1966-1968 for big game (Table 2) and upland birds (Table 3) are part of this report. The harvest of fur animals and waterfowl are reported as jobs of the district projects (W-71-R through W-77-R).

The results of game research data handled by the Data Processing Center have been reported under other appropriate projects.

Prepared by: Merle Rognrud Approved by: Wynn G. Freeman

Date: April 3, 1970

TABLE 1. Average number of days spent by Montana hunters, statewide, hunting certain game species, 1968.

	Deer A Tag	Deer B Tag	Elk	Upland Birds	Turkey	Archery Deer	Archery Elk	Archery Antelope
Days Hunted	4.5	3.8	7.2	5.5	1.8	5.1	4.0	2.1

TABLE 2. Montana big game harvests, statewide, 1966-1968.

Species & Year	No. Licenses		Number of Hunters				Number Killed				% Success	
	Lim.	Unlim.	Low	Point	High	Unlim.	Low	Point	High	Unlim.	Lim.	Unlim.
Deer:												
1966		140,511	105,313	106,180	107,047		96,844	98,104	99,364			92.4
1967		151,131	114,664	115,185	115,706		87,522	88,640	89,757			77.0
1968		159,152	125,203	125,711	126,219		98,123	99,250	100,377			79.0
Elk:												
1966		100,508	54,142	55,113	56,085		11,823	12,450	13,078			22.6
1967		82,882	71,384	71,883	72,382		14,447	15,190	15,934			21.2
1968		88,324	79,156	79,623	80,090		15,983	16,712	17,441			21.0
Antelope:												
1966	21,638		19,104	19,556	20,008		13,669	13,865	14,061		70.9	
1967	19,933		17,614	18,052	18.489		12,407	12,599	12,791		69.8	
1968	18,358		15,986	16,150	16,314		11,287	11,500	11,714		71.3	
Moose:												
1966	688		654	666	669		470	495	519		74.3	
1967	631		607	616	624		409	433	456		70.4	
1968	659		635	643	651		434	457	480		71.1	
Bighorn Sheep:												
1966	82	299	69	74	80	281	35	44	53	32	59.4	11.4
1967	80	184	75	78	80	145	48	56	65	12	72.5	8.3
1968	78	215	71	75	78	186	48	55	63	13	74.3	7.0
Mountain Goat:												
1966	548	1,124	441	459	477	836	202	225	247	250	49.0	29.3
1967	681	300	570	589	608	256	268	294	321	90	50.0	35.0
1968	700	298	579	598	618	207	237	263	289	29	44.0	14.0

Table 2. Montana big game harvests, statewide, 1966-1968. (continued)

Species & Year	No. Licenses		Number of Hunters				Number Killed				% Success	
	Lim.	Unlim.	Low	Point	High	Unlim.	Low	Point	High	Unlim.	Lim.	Unlim.
Black Bear:												
1966		*	9,147	9,760	10,373		1,752	2,002	2,251			20.6
1967		*	9,943	10,571	11,198		1,827	2,096	2,366			19.9
1968		*	7,780	8,287	8,794		1,708	1,950	2,192			23.6
Archery 1968:		2,865	2,235	2,277	2,319							
Deer			1,939	1,988	2,036		246	276	306			13.9
Elk			970	1,021	1,071		23	35	46			3.4
Antelope			86	105	125		0	0	0			0

* A specific bear license not required.

TABLE 3. Montana small game harvest, statewide, 1966-1968.

Year	Number Licenses	Number Hunters	Total Birds	Pheasant	Sharptail	Sage Grouse	Blue Grouse	Ruffed Grouse	Franklin Grouse	Hungarian Partridge	Chukar
Upland Game Birds:											
1966	141,664	83,753	700,200	221,100	140,600	56,700	63,700	54,300	36,300	123,500	4,000
1967	66,617	46,712	432,700	97,100	79,100	29,500	51,000	67,500	35,500	70,600	2,400
1968	68,253	48,548	372,000	95,200	66,800	29,600	40,600	44,700	21,700	70,200	3,200
Turkeys:											
1966	2,960	2,662	620								
1967	1,457	1,185	300								
1968	1,601	1,348	400								

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT

State of Montana

Project No. W-104-R-4 Name Statewide Wildlife Harvest Census and Statistical Services

Job No. I & II Title Statewide Wildlife Harvest Census (and) Statewide Wildlife Statisticial Services

Period Covered: July 1, 1967 through June 30, 1968

Abstract: The Department statistician position remained vacant during the project year. The game harvest census work was maintained using standardized questionnaires and computer programs prepared during previous years. Results of the work were reported in other appropriate project job completion reports. A limited amount of statistical services were provided by the project involving some computer program work and data tabulation for future analyses.

Recommendations: The work of Project W-104-R should be continued. A statistician's services are needed to possibly revise and update game harvest and fur harvest surveys. The quantity of statistical services needed by research projects is expected to increase as data collections are accumulated.

Objectives: To determine by mail survey the number of game animals harvested in Montana each year. To provide statistical and data processing consulting services for wildlife biologists and analyze data as necessary.

Procedures: The statewide harvest census of the various game and fur species was determined by standardized mail survey and prepared computer programs. Samples of the questionnaires used and the computer programs are available at the Department statistician's office. Statistical and data processing consulting services varied according to the needs of the project.

Findings: The Department statistician position remained vacant during the project year. Routine work of the project was performed by standard procedures previously established. A minimum of consulting statistical services was accomplished mainly in the form of computer programming, data tabulation and running established computer programs. Temporary consulting statistical services were obtained.

The standardized game harvest questionnaires were mailed on schedule and analyzed by previously prepared computer programs. Results of the game harvest surveys were distributed to the district surveys and investigations projects.

Prepared by: Merle Rognrud Approved by: Wynn G. Freeman

Date: June 30, 1968

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT

State of Montana

Project No. W-104-R-3 Name Statewide Wildlife Harvest Census and Statistical Services

Job No. I & II Title Statewide Wildlife Harvest Census (and) Statewide Wildlife Statistical Services

Period Covered: July 1, 1966 through June 30, 1967

Abstract: The Department statistican coordinated the statewide game harvest census and obtained harvest figures on the following species: deer, elk, bear, antelope, moose, sheep, goat, turkey, waterfowl, upland game birds and fur bearers. The harvest data for these species were given in the appropriate district wildlife surveys and investigations job completion reports.

The statistician also coordinated and acted as consultant involving statistical analysis, design of programs and use of data processing equipment for eight research jobs: Yellowstone elk, rumen analysis, Gallatin elk research, canopy coverage analysis, Sun River elk research, game harvest mark sense cards and a northwest region plant symbol list. Results of this work were reported in Projects W-83-R, W-91-R, W-98-R and W-105-R.

Recommendations: It is recommended the game harvest census procedures and statistical services be continued to provide the Department with needed information and data analyses for proper game management programs.

Objectives: To determine by mail survey the number of game animals harvested in Montana each year. To provide statistical and data processing consulting services for wildlife biologists and analyze data as necessary.

Procedures: The statewide harvest census of the various game and fur species was determined by standardized mail survey and prepared computer programs. Samples of the questionnaires used and the computer programs are available at the Department statistician's office. Statistical and data processing consulting services varied according to the needs of the project.

Findings: The information assembled and analyzed from the game harvest and fur questionnaires was distributed and reported by Projects W-71-R through W-77-R. Computer programs to analyze the harvest of game and fur species have been prepared and are available at the statistician's office.

Results of the statistical services provided to the research projects have been reported under the appropriate jobs of projects W-83-R, W-91-R, W-98-R and W-105-R. A considerable amount of data processing time was involved in preparing the final report of Sun River Elk Research, Job B-4, Project W-98-R.

Some experimental work was done involving game check mark sensing cards to determine their feasibility. Considerable vegetation canopy coverage data were recorded and listed for future analysis. A plant symbol list for the northwest region was prepared to standardize plant names from different projects in the various analyses to be made of vegetation.

Prepared by: Merle Rognrud Approved by: Wynn G. Freeman

Date: June 13, 1968

JOB COMPLETION REPORT

RESEARCH PROJECT SEGMENT

State of Montana

Name Statewide Wildlife Harvest Census and Statistical Services

Project No. W-104-R-2

Job No. II

Title Statistical Services

Period Covered July 1, 1965 through June 30, 1966

Abstract:

The Department Statistician acted as consultant on 10 projects during the time period above. These projects involved consultation on statistical analysis, design or the coordination and use of data processing equipment by Game Division personnel.

Recommendations:

It is recommended that the statistical and data processing consulting services for project leaders requesting such services be continued.

Objectives:

To provide consulting in statistical methods and data processing and to analyze the data as necessary for the individuals involved.

Techniques and Findings:

When requested, the Department Statistician assisted personnel in using the proper statistical techniques in the collection and analysis of data.

The following projects were worked on in the time period covered. The methods of analyses are included in the reports for these projects:

1. Analysis of deer, elk and cattle grazing and behavior patterns in the Lewistown, Montana area (Project Leader, Richard Mackie) W-98-R.

2. Analysis of sharptail data collected in reference to bird behavior and habitat (Project Leader, Robert Brown) W-91-R.

3. Data processing and initial statistical analysis of reduction of the Yellowstone elk herd data being analyzed in the Fish and Game Laboratory (Project Leader, Kenneth Greer) W-98-R.

4. Data processing of data collected on Sun River elk herd to determine behavior, movement and food habits (Project Leader, Richard Knight) W-98-R.

5. Analysis of waterfowl banding and mortality distribution to determine their effects on Montana's waterfowl harvest. (Project Leaders, Dale Witt and Gerald Salinas) W-56-D and W-80-D.

6. Data processing and analysis of data collected from upland game bird hunters on the primary feather molt. Age and sex classifications were provided to District Game Managers, Projects W-71-R through W-73-R.

7. Established file to allow the use of data processing equipment for the analysis of vegetation use by game species. In conjunction with this, computer programs were written for feeding site analysis and canopy coverage analysis based on the Daubenmire plot method.

8. Established procedures for making observations of animals that have been banded or marked and setup forms that would allow the most convenient collection of data in the field and the most reliable data processing (Project Leaders James Peek and David Stevens) W-98-R.

Prepared by Thomas H. Leik Approved by Wynn G. Freeman

Date May 1, 1966

JOB COMPLETION REPORT

RESEARCH PROJECT SEGMENT

State of Montana

Project No. W-104-R-2

Job No. I

Name Statewide Wildlife Harvest Census and Statistical Services

Title Statewide Wildlife Harvest Census

Period Covered July 1, 1965 through June 30, 1966

Abstract:

Statewide harvest was obtained by mail surveys on all species open to hunting or trapping. This information was reported to the districts for inclusion in their reports. A statewide file is kept in the central office. Harvest figures were obtained on the following species: deer, elk, bear, moose, bighorn sheep, mountain goat, antelope, turkey, waterfowl, upland game birds and fur bearers.

Recommendations:

The statewide wildlife game harvest census conducted by mail surveys should be continued. This data represents a statewide record of harvest by individual hunting district. It is, therefore, important that the continuity of the data remain. The trend information over a long period of time is essential for the management of certain species. Specific information on a hunting district is frequently a factor in making decisions or setting game seasons.

The evaluation of sample sizes in relation to cost and precision of data returned should be continued. This evaluation should be completed as rapidly as possible to establish the validity of the survey for any given area.

Objectives:

1. Determine by mail survey the number of game animals harvested in Montana each year.

2. Establish the statistical reliability of the data by subjecting it to the appropriate statistical treatment or tests.

3. Establish electronic data processing systems that will permit this data to be analyzed rapidly and disseminated to the field as soon after the hunting season as possible.

4. Detailed information will vary from species to species, but will basically consist of number of hunters afield, number of animals killed, percent success, time period of year hunted, sex and age class of animal killed, license type held by the individual hunter.

Techniques Used:

Prior to the end of each hunting season, an appropriate questionnaire is mailed to a portion of those people hunting in Montana that year. These are usually mailed on the last Thursday prior to the end of a hunting season. In this way,

the questionnaires are in the hands of the people for their answers that weekend. One week later a reminder card is mailed to all of the people who have not responded to the questionnaire. At the end of 30 days, returns are cut off and the data processed.

An exception to this is the waterfowl survey. On this survey, a questionnaire is mailed out at the end of the season. Following the first questionnaire, a postcard reminder is mailed to nonrespondents. One week later, a second questionnaire is mailed to the remaining nonrespondents. The data is analyzed 30 days later.

All of the data is expanded on the basis of weighted ratio estimates based on the distribution of license sales. Since the license sales are incomplete at this time, a regression estimate of license sales must be made for expansion of harvest data. Confidence limits used throughout the data analysis are normal approximations to the binomials computed on the IBM 360 computer, Model 30 system.

This information is distributed to each of the seven districts for their file and statewide file copies are kept in the Helena office. In the case of the annual deer, elk and bear harvest survey, the print-out from the computer is approximately 250 pages. Due to the cost of distribution, these have not been made available to other than the above sources.

An analysis of optimum allocation of sample sizes through statistical techniques was made and reviewed. This is an integral part of the computer program whereby the computer prints, as a by-product, the sample size we should take for each area on the basis of the information we have collected. This acts as a guide for the next year's sampling and the planning for next year's work.

Findings:

The information gathered by this project is distributed to the districts and respective project leaders for their use and reports. The information can be found in their Job Completion Reports. The district Completion Reports referred to are W-71-R, W-72-R, W-73-R, W-74-R, W-75-R, W-76-R and W-77-R.

Writing of computer programs continued by personnel associated with the project. Basically these were programs to determine annual fur harvest by county, district and state and a series of waterfowl programs. These programs were to determine the distribution, mortality and harvest of Montana's waterfowl. The above programs became a part of the program library being developed for analysis of game data.

Prepared by Thomas H. Leik Approved by Wynn G. Freeman

Date May 1, 1967

JOB COMPLETION REPORT

RESEARCH PROJECT SEGMENT

State of Montana

Project No. W-104-R-1 Name Statewide Wildlife Harvest Census and Statistical Services

Job No. I Title Statewide Wildlife Harvest Census

Period Covered July 1, 1964 to June 30, 1965

Abstract:

Statewide harvest was obtained by mail surveys on all species open to hunting or trapping. This information was reported to the districts for inclusion in their reports. A statewide file is kept in the central office. Harvest figures were obtained on the following species: deer, elk, bear, moose, big horn sheep, mountain goat, antelope, turkey, waterfowl, upland game birds and fur bearers.

Recommendations:

The statewide wildlife game harvest census conducted by mail surveys should be continued. This data represents a statewide record of harvest by individual hunting district. It is, therefore, important that the continuity of the data remain. The trend information over a long period of time is essential for the management of certain species. Specific information on a hunting district is frequently a factor in making decisions or setting game seasons.

The evaluation of sample sizes in relation to cost and precision of data returned should be continued. This evaluation should be completed as rapidly as possible to establish the validity of the survey for any given area.

Objectives:

1. Determine by mail survey the number of game animals harvested in Montana each year.

2. Establish the statistical reliability of the data by subjecting it to the appropriate statistical treatment or tests.

3. Establish electronic data processing systems that will permit this data to be analyzed rapidly and disseminated to the field as soon after the hunting season as possible.

4. Detailed information will vary from species to species, but will basically consist of number of hunters afield, number of animals killed, percent success, time period of year hunted, sex and age class of animal killed, license type held by the individual hunter.

Techniques Used:

Prior to the end of each hunting season, an appropriate questionnaire is mailed out to a portion of those people hunting in Montana that year. These are usually mailed on Thursday so that the questionnaires are in the hands of the people for their answers that weekend. One week later a reminder card is mailed to all of the people who have not responded to the questionnaire. At the end of 30 days, returns are cut off and the data processed.

An exception to this is the waterfowl survey. On this survey, a questionnaire is mailed out at the end of the season. Following the first questionnaire, a postcard reminder is mailed to nonrespondents. One week later, a second questionnaire is mailed to the remaining nonrespondents. The data is analyzed 30 days later.

All of the data is expanded on the basis of weighted ratio estimates based on the distribution of license sales. Since the license sales are incomplete at this time, a regression estimate of license sales must be made for expansion of harvest data. Confidence limits used throughout the data analysis are normal approximations to the binomials computed on the IBM 1620 Computer, Model II.

This information is distributed to each of the seven districts for their file and statewide file copies are kept in the Helena office. In the case of the annual deer, elk and bear harvest survey, the print-out from the computer is approximately 250 pages. Due to the cost of distribution, these have not been made available to other than the above sources.

An analysis of optimum allocation of sample sizes through statistical techniques was made. This is an integral part of the computer program whereby the computer prints out, as a by-product, the sample size we should take for each area on the basis of the information we have collected. This acts as a guide for the next year's sampling and the planning for next year's work. The statistical analyses for this work was done by the project leader and Mr. Hans Hamann, Statistician, Montana State University. It was programmed by Mr. John Miller, Montana State University.

Findings:

The information gathered by this project is distributed to the districts and respective project leaders for their use and reports. The information can be found in their Job Completion Reports. The district Completion Reports referred to are W-71-R, W-72-R, W-73-R, W-74-R, W-75-R, W-76-R and W-77-R.

A procedure for estimating the number of licenses that should be sampled to give the proper sample sizes for deer, and elk was developed by Mr. Hans Hamann, Consulting Statistician, Montana State University. Due to the disproportionate sampling of the various license groups (i.e. elk license holders are sometimes sampled higher than deer license holders), it is

necessary to have a refined statistical treatment for this analysis. The sample sizes from some hunting districts are so small that they tell us very little. These are usually areas where few people are hunting and where management has the most leniency; therefore, the sample size does not have to be precisely correct. There are other areas, however, that are critical to the Game Manager in terms of harvest and the techniques set forth by Mr. Hamann and subsequently incorporated in our computer harvest output permit us to determine the proper sample size for each hunting district. Basically, Mr. Hamann approaches the subject from the standpoint that the proportion of people hunting in any given area is statistically greater than or equal to zero. Upon making the test against zero, if it is found that the hunting pressure that occurs there is significant, then the appropriate number of questionnaires for that area is computed for that license type.

Literature cited:

1965, Hamann, Hans K., Methods For Estimating Hunting and Kill Pressure on Montana's Deer, Elk and Bear Populations and Estimating Sample Sizes To Be Drawn For the Succeeding Year. Unpublished Manuscript, Montana Fish and Game Department. 12 pp.

Prepared by Thomas H. Leik Approved by Wynn G. Freeman

Date June 24, 1966

JOB COMPLETION REPORT

RESEARCH PROJECT SEGMENT

State of Montana

Project No. W-104-R-1 Name Statewide Wildlife Harvest Census and Statistical Services

Job No. II Title Statistical Services

Period Covered July 1, 1964 to June 30, 1965

Abstract:

The Department Statistician acted as consultant on 10 projects during the time period above. These projects involved consultation on statistical analysis, design or the coordination and use of data processing equipment by Game Division personnel.

Recommendations:

It is recommended that the statistical and data processing consulting services for project leaders requesting such services be continued.

Objectives:

To provide consulting in statistical methods and data processing and to analyze the data as necessary for the individuals involved.

Techniques and Findings:

When requested, the Department Statistician assisted personnel in using the proper statistical techniques in the collection and analysis of data.

The following projects were worked on in the time period covered. The methods of analyses are included in the reports for these projects:

1. Analysis of deer, elk and cattle grazing and behavior patterns in the Lewistown, Montana area (Project Leader, Richard Mackie) W-98-R-5.

2. Analysis of sharptail data collected in reference to bird behavior and habitat (Project Leader, Robert Brown) W-91-R-8.

3. Data processing and initial statistical analysis of reduction of the Yellowstone elk herd data being analyzed in the Fish and Game Laboratory (Project Leader, Kenneth Greer) W-98-R-5.

4. Analysis of the effect of fertilizers, mowing and other treatments at the Wall Creek Game Range area, W-73-R-10.

5. Data processing of data collected on Sun River elk herd to determine behavior, movement and food habits (Project Leader, Richard Knight) W-98-R-5.

6. Analysis of waterfowl banding and mortality distribution to determine proper location of flyway boundaries, Special Report, Montana Fish and Game Commission.

7. Analysis of the effect of chlorinated hydrocarbons on blue grouse as a result of Forest Service operations in Western Montana, W-91-R-8.

8. Establishment of data processing procedures allowing control of postseason elk hunts following migration of elk in Yellowstone Park, W-73-R-10.

9. Data processing and analysis of data collected from upland game bird hunters on the primary feather molt. Age and sex classifications were provided to District Game Managers, W-71-R through W-73-R.

10. Established file to allow the use of data processing equipment for the analysis of vegetation use by game species. In conjunction with this, computer programs were written for feeding site analysis and canopy coverage analysis based on the Daubenmire plot method.

Prepared by Thomas H. Leik Approved by Wynn G. Freeman

Date June 24, 1966